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MEDIUM-MU TRIODE

SUBMINIATURE TYPE

For "on-off" control applications involving long periods of operation under cutoff conditions with full ratings at altitudes up to 80,000 feet

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:
- Voltage . . . . 6.3 . . . . . . ac or dc volts
- Current . . . . 0.15 . . . . amp

Direct Interelectrode Capacitances (Approx.):

	Without External Shield	With External Shield°	
Grid to plate	1.4	1.3	μμf
Grid to cathode and heater	2.2	2.4	μμf
Plate to cathode and heater	0.7	2.4	μμf

Characteristics, Class A_1 Amplifier:

Plate-Supply Voltage	100	volts
Cathode Resistor	150	ohms
Transconductance	6000	μmhos
Amplification Factor	29	
Plate Resistance (Approx.)	4800	ohms
Plate Current	10	ma
Plate Current for plate-supply volts = 125, grid-supply volts = +3, plate load resistor (ohms) = 2700, and grid resistor (ohms) = 60,000	15.5	ma
Maximum Grid-Supply Voltage for plate μa = 100 with plate-supply volts = 140, plate load resistor (ohms) = 2700, and grid resistor (ohms) = 60,000	-8.5	volts

Mechanical:

Operating Position . . . . Any
Maximum Length (Excluding flexible leads) . . . . 1-3/8"
Length, Base Seat to Bulb Top (Excluding tip) . . . . 1.075" ± 0.060"
Diameter . . . . 0.366" to 0.400"
Dimensional Outline . . . . *See General Section*
Bulb T3
Leads, Flexible, Tinned 8
- Minimum length . . . . 1.5"
- Orientation and diameter . . . . *See Dimensional Outline*
- Maximum untinned distance from base seat . . . . . . 0.050"

Base . . . . JETEC No. E8-10

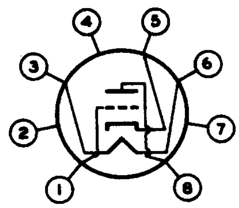
°: See next page.

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BOTTOM VIEW



Lead 1 - Grid
Lead 2 - No Connection
Lead 3 - Heater
Lead 4 - No Connection
Lead 5 - Cathode
Lead 6 - Heater
Lead 7 - No Connection
Lead 8 - Plate

COMPUTER SERVICE and "ON-OFF" CONTROL SERVICE

Maximum Ratings, *Absolute Values:*

For operation at altitudes up to 80,000 feet

DC PLATE VOLTAGE	275	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE*	600	max.	volts
DC GRID VOLTAGE:			
Negative bias value	55	max.	volts
Positive bias value	5.5	max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE*	220	max.	volts
PEAK POSITIVE-PULSE GRID VOLTAGE*	27.5	max.	volts
DC GRID CURRENT	5.5	max.	ma
PEAK GRID CURRENT*	110	max.	ma
DC CATHODE CURRENT	22	max.	ma
PEAK CATHODE CURRENT*	440	max.	ma
PLATE DISSIPATION	2.2	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200†	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	165	max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance	1	max.	megohm

° With external shield having inside diameter of 0.405" connected to cathode.

* Under the following conditions: rectangular pulse; pulse-repetition rate, 1000 pps; pulse width, 10 microseconds; and duty factor, 1 per cent.

† The dc component must not exceed 100 volts. For reliable operation, it is recommended that this value be kept as low as possible.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	138	162	ma
Heater Current at 500 hours	1	136	166	ma
Direct Interelectrode Capacitances:				
Grid to plate	2	1.1	1.8	μμf
Grid to cathode and heater	2	1.6	2.8	μμf
Plate to cathode and heater	2	0.5	0.9	μμf

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	Note	Min.	Max.	
Plate Current (1)	1,3	7.5	12.5	ma
Plate Current (2)	4	13	–	ma
Plate Current (3)	1,5	14	–	ma
Plate Current (3):				
At 500 hours.	1,5	13	–	ma
At 1000 hours	1,5	13	–	ma
Transconductance.	1,3	5000	7000	µmhos
Amplification Factor.	1,3	25	33	
Reverse Grid Current.	1,6	–	-0.4	µa
Reverse Grid Current:				
At 500 hours.	1,6	–	-0.6	µa
At 1000 hours	1,6	–	-0.6	µa
Grid Emission Current	7	–	-0.5	µa
Grid-Supply Voltage for plate µa = 100.	1,8	–	-8.5	volts
Grid-Supply Voltage for plate µa = 100 at 500 and 1000 hours.	1,8	–	-8.5	volts
Heater-Cathode Leakage Current:				
Heater 100 volts negative with respect to cathode.	1	–	5	µa
Heater 100 volts positive with respect to cathode.	1	–	5	µa
Heater-Cathode Leakage Current at 500 hours:				
Heater 100 volts negative with respect to cathode.	1	–	10	µa
Heater 100 volts positive with respect to cathode.	1	–	10	µa
Leakage Resistance:				
Between grid and all other electrodes tied together. . .	1,9	50	–	megohms
Between plate and all other electrodes tied together. . .	1,10	50	–	megohms
Leakage Resistance at 500 and 1000 hours:				
Between grid and all other electrodes tied together. . .	1,9	25	–	megohms
Between plate and all other electrodes tied together. . .	1,10	25	–	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Without external shield.

Note 3: With plate volts = 100, grid volts = 0, and cathode resistor (ohms) = 150.

Note 4: With heater volts = 5.7 ac or dc, plate-supply volts = 125, grid-supply volts = +3, plate load resistor (ohms) = 2700, and grid resistor (ohms) = 60,000.

Note 5: With plate-supply volts = 125, grid-supply volts = +3, plate load resistor (ohms) = 2700, and grid resistor (ohms) = 60,000.

Note 6: With plate-supply volts = 150, cathode resistor (ohms) = 220, and grid resistor (megohms) = 1.

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Note 7: With heater volts = 7.5 ac or dc, plate volts = 100, grid volts = -8.5, and grid resistor (megohms) = 1. Prior to this test, tubes are operated for a minimum of 5 minutes under the following conditions: heater volts = 7.5, plate-supply volts = 150, cathode resistor (ohms) = 220, and grid resistor (megohms) = 1.

Note 8: With plate-supply volts = 140, plate load resistor (ohms) = 2700, and grid resistor (ohms) = 60,000.

Note 9: With grid volts = -100.

Note 10: With plate volts = -300.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration. . . . . 450 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are subjected in four different positions to an impact acceleration of 450 g. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, plate current (3), and plate-current cutoff.

Fatigue Rating:

Vibrational Acceleration . . . . 2.5 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected to 2.5 g vibrational acceleration at a fixed frequency between 25 and 60 cps for 32 hours in each of three positions. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, plate current (3), and plate-current cutoff.

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . 50 max. mv

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 6.3, plate-supply volts = 100, cathode resistor (ohms) = 150, cathode-bypass capacitor (μf) = 1000, plate load resistor (ohms) = 10,000 and vibrational acceleration of 15 g at 40 cps.

Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . . . . 2000 min. cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 7 cycled one minute on and four minutes off, heater 140 volts rms with respect to cathode, and all other elements connected to ground. At the end of this test, tubes will not show heater-cathode shorts, or open circuits.

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Shorts and Continuity Test:

This test, in addition to a 100 per cent factory test, is performed on a sample lot of tubes from each production run. In this test, a tube is considered inoperative if it shows a permanent or temporary short or open circuit, a high-resistance intermittent short of less than 10 megohms for a duration of at least one millisecond, or a value of reverse grid current in excess of 1 microampere under the conditions specified in the CHARACTERISTICS RANGE VALUES for reverse grid current.

Cathode-Interface-Resistance Life Test:

A sample lot of tubes from each production run is life tested at an accelerated voltage of 7 volts and with zero cathode current. At the end of 500 hours, tubes will not show a cathode-interface resistance in excess of 50 ohms when measured in accordance with Method B, the Frost Method, of ASTM Standard F 300-55T at heater volts = 6, plate volts = 100, plate current adjusted to 1 milliampere, and with 50-kc, square-wave signal volts = 0.2.

100-Hour Survival Life Performance:

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early inoperatives. Conditions of life testing are specified under 500-Hour Intermittent Life Performance, except test is run at room temperature. At the end of 100 hours, a tube will not show permanent or temporary shorts or open circuits and will meet the established limit for plate current (3) under the conditions specified in CHARACTERISTICS RANGE VALUES.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. Life testing is conducted under the following conditions: heater volts = 6.3, plate-supply volts = 150, heater-cathode volts = 200 (heater positive with respect to cathode), cathode resistor (ohms) = 220, grid resistor (megohms) = 1 and bulb temperature (°C) = 165. At the end of 500 hours, tube will not show permanent shorts or open circuits and will meet established 500-hour limits for heater current, plate current (3), plate-current cutoff, reverse grid current, heater-cathode leakage current, and leakage resistance as shown under CHARACTERISTICS RANGE VALUES.

1000-Hour Intermittent Life Performance:

This test is made on a sample lot of tubes from each production run to further insure high quality of the individual tube and to guard against epidemic failures of any

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of the characteristics indicated below. Test conditions are the same as those specified under 500-Hour Average Life Performance. At the end of 1000 hours, tubes will not show permanent or temporary shorts or open circuits and will meet the established 1000-hour limits for plate current (3), plate-current cutoff, reverse grid current, and leakage resistance as shown under CHARACTERISTICS RANGE VALUES.

OPERATING CONSIDERATIONS

The *heater supply* should be well regulated because life and reliability of the 6814 are adversely affected by departures from the 6.3-volt value. The extent to which life is affected is a function of the amount of these departures and their durations.

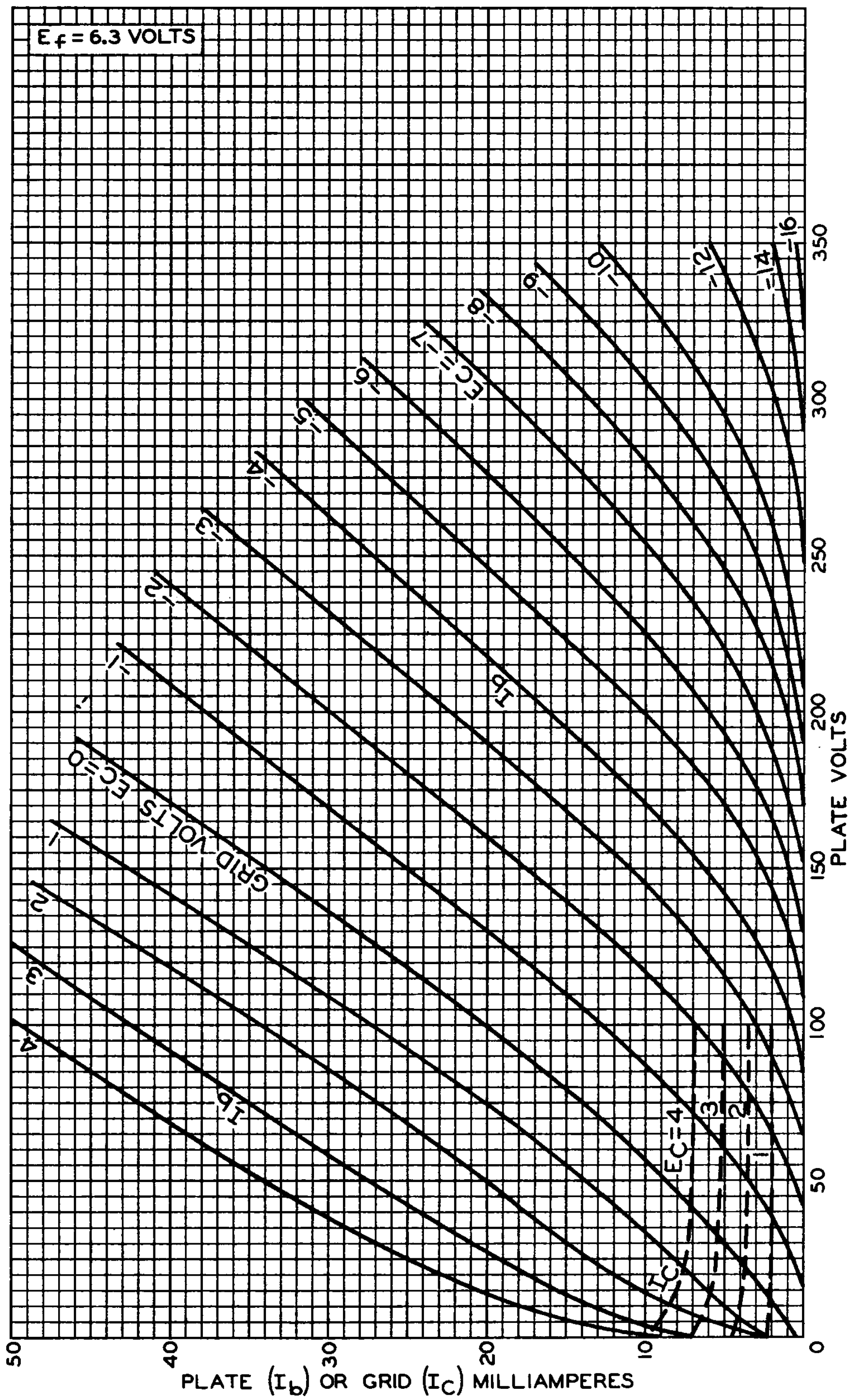
The *flexible leads* of the 6814 are usually soldered to the circuit elements. Soldering of the connections should be made as far as possible from the glass button. If this precaution is not followed, the heat of the soldering operation will crack the glass seals of the leads and damage the tube.

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AVERAGE CHARACTERISTICS



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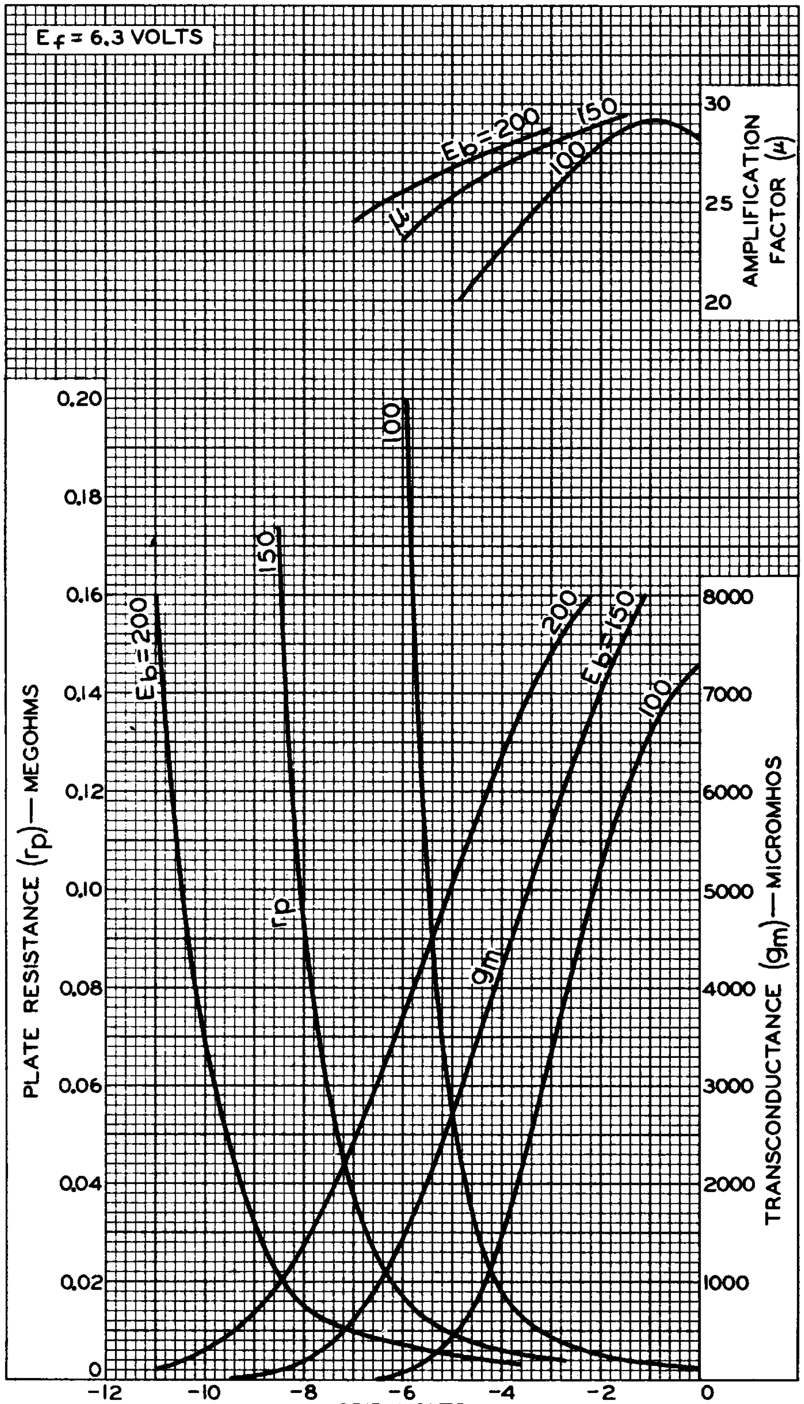
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AVERAGE CHARACTERISTICS



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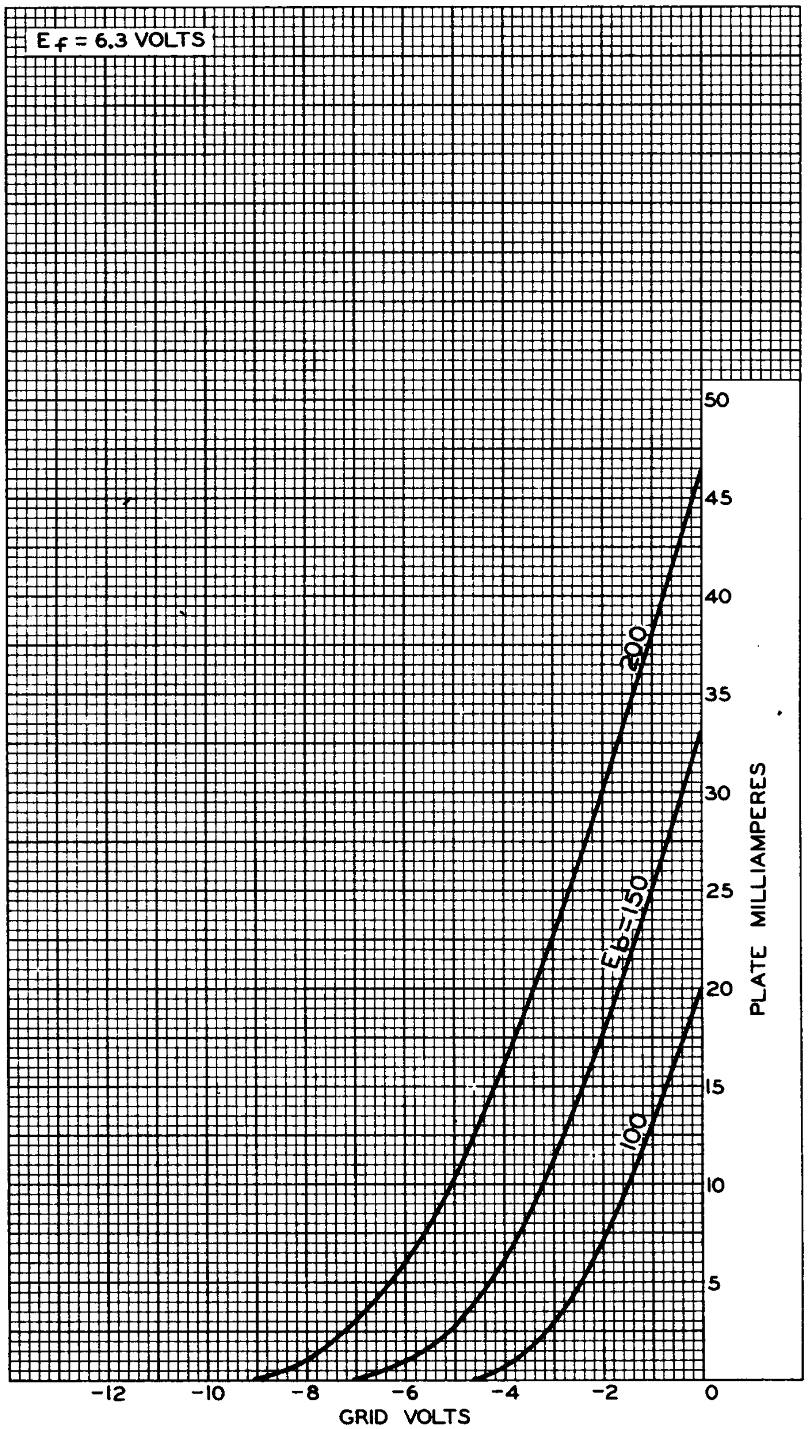
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AVERAGE CHARACTERISTICS



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